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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/650,075	08/29/2000	Steven Saban	83-96A	9196

23713 7590 07/08/2002

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EXAMINER
NOGUEROLA, ALEXANDER STEPHAN

ART UNIT	PAPER NUMBER
1743	4

DATE MAILED: 07/08/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

MF=4

Office Action Summary	Application No. 09/650,075	Applicant(s) SABAN ET AL.	
	Examiner ALEX NOGUEROLA	Art Unit 1743	

-- Th MAILING DATE of this communication appears on the cover sh t with th correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 August 2000 and 27 June 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *32-48* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *32-48* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 August 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *3* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Interview Summary	Application No. 09/650,075	Applicant(s) SABAN ET AL.	
	Examiner ALEX NOGUEROLA	Art Unit 1743	

All participants (applicant, applicant's representative, PTO personnel):

(1) *ALEX NOGUEROLA*. (3)_____.

(2) *Sally Sullivan*. (4)_____.

Date of Interview: *27 June 2002* .

Type: a)☒ Telephonic b)☐ Video Conference

c)☐ Personal [copy given to: 1)☐ applicant 2)☐ applicant's representative]

Exhibit shown or demonstration conducted: d)☐ Yes e)☒ No.
If Yes, brief description: _____ .

Claim(s) discussed: *all pending claims* .

Identification of prior art discussed: *none* .

Agreement with respect to the claims f)☒ was reached. g)☐ was not reached. h)☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *In response to a restriction requirement Miss Sullivan elected the invention of Group II, claims 34-48* .

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

i)☒ It is not necessary for applicant to provide a separate record of the substance of the interview(if box is checked).

Unless the paragraph above has been checked, THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

_____
Examiner's signature, if required

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 32 and 33, drawn to a method of making a microband electrode array sensor, classified in class 216, subclass 13.

   II. Claims 34-48, drawn to a method of using a microband electrode array sensor, classified in class 205, subclass 775.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions Group I and Group II are unrelated. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different modes of operation, different functions, or different effects (MPEP § 806.04, MPEP § 808.01). In the instant case the different inventions have different modes of operation, different functions, and different effects. The invention of Group I is directed towards a method of making a microband electrode array sensor and the invention of Group II is directed towards a method of using a microband electrode array sensor. There is no disclosure of the invention of Group I being used with the invention of Group II; indeed, this is impossible because the microband electrode array sensor must exist before it can be used. The two inventions are also different in their modes of operation, function, and effects. For example, the invention of Group I involves

photolithography, which is not required by the invention of Group II. On the other hand, the invention of Group II involves using voltage, which is not required by the invention of Group I. The invention of Group I functions to produce a product. The invention of Group II uses a product to produce a measurement result.

3. Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with Sally Sullivan on June 30, 2002 a provisional election was made with traverse to prosecute the invention of Group II, claims 34-48. Affirmation of this election must be made by applicant in replying to this Office action. Claims 32 and 33 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

6. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the alignment of the first edges of the substrate, insulating material, and electrodes to form a single edge as provide in Claims 46-48 must be shown or the feature canceled from the claims. No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Figure 6A of the instant applicant does not show an alignment of first edges of the substrate, insulating material, and electrodes to form a single edge as claimed.

Double Patenting

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claim 34 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 21 and 29 of U.S. Patent No. 6,110,354. Although the conflicting claims are not identical, they are not patentably distinct from each other because

Claims 21 and 29 of U.S. Patent No. 6,110,354 together include all of the limitations of Claim 34 of the instant application. Note that having a gap length between adjacent electrodes such that no substantial overlap of diffusion layers occurs is inherent when there is steady-state behavior as required by Claim 21 of U.S. Patent No. 6,110,354. See column 5, lines 23-26 of the instant application.

9. Claim 35 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 2, 21, and 29 of U.S. Patent No. 6,110,354. The rejection of Claim 34 has been addressed in the previous paragraph. Although the conflicting claims are not identical, they are not patentably distinct from each other because Claims 2, 21, and 29 of U.S. Patent No. 6,110,354 together includes all of the limitations of Claim 35 of the instant application. Claim 35 of the instant application requires that each of the microband electrodes has a width less than about 25 micrometers and a thickness less than about 25 micrometers. Claim 1, from which Claim 29 depends, of U.S. Patent No. 6,110,354 requires that the microband electrode width be less than or equal to about 25 micrometers, but does not mention a microband electrode thickness range. Claim 2 of U.S. Patent No. 6,110,354, however, requires a microband thickness of 0.1 micrometer, which is within the claimed range of Claim 35 of the instant application. Thus the limitations of Claim 35 of the instant application are required in Claims 2, 21, and 35 of U.S. Patent No. 6,110,354.

10. Claim 36 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 21 and 29 of U.S. Patent No. 6,110,354. Although

the conflicting claims are not identical, they are not patentably distinct from each other because Claims 21 and 29 of U.S. Patent No. 6,110,354 together include all of the limitations of Claim 34 of the instant application. Note that having a gap length between adjacent electrodes such that no substantial overlap of diffusion layers occurs is inherent when there is steady-state behavior as required by Claim 21 of U.S. Patent No. 6,110,354. See column 5, lines 23-26 of the instant application.

11. Claim 37 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 2, 21, and 29 of U.S. Patent No. 6,110,354. The rejection of Claim 36 has been addressed in the previous paragraph. Although the conflicting claims are not identical, they are not patentably distinct from each other because Claims 2, 21, and 29 of U.S. Patent No. 6,110,354 together includes all of the limitations of Claim 36 of the instant application. Claim 37 of the instant application requires that each of the microband electrodes has a width less than about 25 micrometers and a thickness less than about 25 micrometers. Claim 1, from which Claim 29 depends, of U.S. Patent No. 6,110,354 requires that the microband electrode width be less than or equal to about 25 micrometers, but does not mention a microband electrode thickness range. Claim 2 of U.S. Patent No. 6,110,354, however, requires a microband thickness of 0.1 micrometer, which is within the claimed range of Claim 37 of the instant application. Thus the limitations of Claim 37 of the instant application are required in Claims 2, 21, and 35 of U.S. Patent No. 6,110,354.

12. Claims 38 and 39 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 21 and 31 of U.S. Patent No. 6,110,354. Although the conflicting claims are not identical, they are not patentably distinct from each other because Claims 21 and 31 of U.S. Patent No. 6,110,354 together include all of the limitations of Claims 38 and 39 of the instant application. Note that having a gap length between adjacent electrodes such that no substantial overlap of diffusion layers occurs is inherent when there is steady-state behavior as required by Claim 21 of U.S. Patent No. 6,110,354. See column 5, lines 23-26 of the instant application.

13. Claims 38 and 40 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 21 and 32 of U.S. Patent No. 6,110,354. Although the conflicting claims are not identical, they are not patentably distinct from each other because Claims 21 and 32 of U.S. Patent No. 6,110,354 together include all of the limitations of Claims 38 and 40 of the instant application. Note that having a gap length between adjacent electrodes such that no substantial overlap of diffusion layers occurs is inherent when there is steady-state behavior as required by Claim 21 of U.S. Patent No. 6,110,354. See column 5, lines 23-26 of the instant application.

14. Claims 38 and 41 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 21 and 33 of U.S. Patent No. 6,110,354. Although the conflicting claims are not identical, they are not patentably distinct from each other because Claims 21 and 33 of U.S. Patent No. 6,110,354 together include all of the limitations of Claims 38 and 41 of the instant application. Note that having a gap length between adjacent electrodes such that no substantial overlap of diffusion layers occurs is inherent when there is steady-state behavior as required by Claim 21 of U.S. Patent No. 6,110,354. See column 5, lines 23-26 of the instant application.

15. Claims 38 and 42 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 21 and 30 of U.S. Patent No. 6,110,354. Although the conflicting claims are not identical, they are not patentably distinct from each other because Claims 21 and 30 of U.S. Patent No. 6,110,354 together include all of the limitations of Claims 38 and 42 of the instant application. Note that having a gap length between adjacent electrodes such that no substantial overlap of diffusion layers occurs is inherent when there is steady-state behavior as required by Claim 21 of U.S. Patent No. 6,110,354. See column 5, lines 23-26 of the instant application.

16. Claims 38 and 43 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 21 and 29 of U.S. Patent No. 6,110,354. Although the conflicting claims are not identical, they are not patentably distinct from each other because Claims 21 and 29 of U.S. Patent No. 6,110,354 together include all of the limitations of Claims 38 and 43 of the instant application. Note that having a gap length between adjacent electrodes such that no substantial overlap of diffusion layers occurs is inherent when there is steady-state behavior as required by Claim 21 of U.S. Patent No. 6,110,354. See column 5, lines 23-26 of the instant application.

17. Claims 38 and 44 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 21 and 34 of U.S. Patent No. 6,110,354. Although the conflicting claims are not identical, they are not patentably distinct from each other because Claims 21 and 34 of U.S. Patent No. 6,110,354 together include all of the limitations of Claims 38 and 44 of the instant application. Note that having a gap length between adjacent electrodes such that no substantial overlap of diffusion layers occurs is inherent when there is steady-state behavior as required by Claim 21 of U.S. Patent No. 6,110,354. See column 5, lines 23-26 of the instant application.

18. Claim 45 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 21, 34, and 12 of U.S. Patent No. 6,110,354. Although the conflicting claims are not identical, they are not patentably distinct from each other

because Claims 21, 34, and 12 of U.S. Patent No. 6,110,354 together include all of the limitations of Claim 45 of the instant application. Note that having a gap length between adjacent electrodes such that no substantial overlap of diffusion layers occurs is inherent when there is steady-state behavior as required by Claim 21 of U.S. Patent No. 6,110,354. See column 5, lines 23-26 of the instant application.

19. Claims 46 and 47 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 21, 31, and 16 of U.S. Patent No. 6,110,354. Although the conflicting claims are not identical, they are not patentably distinct from each other because Claims 21, 31, and 16 of U.S. Patent No. 6,110,354 together include all of the limitations of Claims 46 and 47 of the instant application. Note that having a gap length between adjacent electrodes such that no substantial overlap of diffusion layers occurs is inherent when there is steady-state behavior as required by Claim 21 of U.S. Patent No. 6,110,354. See column 5, lines 23-26 of the instant application.

20. Claims 46 and 48 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 21, 32, and 16 of U.S. Patent No. 6,110,354. Although the conflicting claims are not identical, they are not patentably distinct from each other because Claims 21, 32, and 16 of U.S. Patent No. 6,110,354 together include all of the limitations of Claims 46 and 48 of the instant application. Note that having a gap length between adjacent electrodes such that no substantial overlap of diffusion layers occurs is inherent when

there is steady-state behavior as required by Claim 21 of U.S. Patent No. 6,110,354. See column 5, lines 23-26 of the instant application.

21. Claim 39 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 34. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

22. Claim 40 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 36. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Objections

23. Claim 36 is objected to because of the following informality: "voltammetry.." in line 16. Appropriate correction is required.

24. Claim 36 is objected to because of the following informality: "step" in line 12. Appropriate correction is required.

Claim Rejections - 35 USC § 112

25. Claims 34-48 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention:

a) Claim 45, line 1: should "14" be -- 44 --?

b) Regarding claims 34, 36, 38, and 46, the phrase "of the kind" (within the first three lines of each of these claims) renders the claims indefinite because the claims include elements not actually disclosed (those encompassed by "of the kind"), thereby rendering the scope of the claim(s) unascertainable. See MPEP § 2173.05(d); and

c) Claim 38: the last line should be replaced with -- and (b) detecting an analyte in the sample. --

Note that dependent claims will have the deficiencies of base and intervening claims.

Claim Rejections - 35 USC § 102

26. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

27. Claims 34, 35, 38, 39, and 41-43 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Thormann et al. ("Voltammetry at Linear Gold and Platinum Microelectrode Arrays Produced by Lithographic Techniques," Anal. Chem. 1985, 57, 2764-2770). See Figures 2, 3, and 4 and Table II on page 2766. For the width and thickness ranges of Claim 35 see the details of array I in Table II on page 2766.

Claim Rejections - 35 USC § 103

28. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

29. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

30. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sauer (US 5,407,554) in view of Kuhr et al. (US 5,958,215) and Thormann et al. ("Voltammetry at Linear Gold and Platinum Microelectrode Arrays Produced by Lithographic Techniques," Anal. Chem. 1985, 57, 2764-2770).

Addressing Claim 34, Sauer teaches a method of utilizing a band electrode array sensor of the kind comprising

a substrate having a first edge (element 1 in Figures 12 and 14);

a layer of insulating material, on top of the substrate, the layer of insulating, material having a first edge (element 29 in Figures 12 and 14);

the first edge of the substrate and the first edge of the insulating material aligned to form a single edge (Figures 12 and 14);

a plurality of band electrodes between the substrate and the layer of insulating material, a surface of each of the band electrodes exposed at the single edge (Figures 12 and 14); and

a plurality of gaps, one gap between each of two adjacent band electrodes, the method comprising the step of

contacting the sensor with a sample suspected of containing an analyte (implied by col. 8, ll. 34-62, which teaches moistening the edge of the disc with analytical sample).

Sauer does not mention that the band electrodes are microband electrodes; however, this is implied by Claim 19 and Figures 12 and 14, which discloses that up to 24 narrow electrodes may be on a substrate disc having a diameter of 5 cm.

Sauer also does not mention that that the gaps between the electrodes are sufficient to prevent substantial overlap of diffusion layers; however, as shown by Thormann et al. it was

known at the time of the invention that if electrodes are too closely spaced together inaccuracies in the measurement will result (last paragraph in the second column of page 2766 bridging to page 2767). Thus it would have been obvious to one with ordinary skill in the art at the time the invention was made to have gaps between the electrodes large enough to avoid inaccuracies such as non-steady-state currents due to diffusion effects as taught by Thormann et al. in the invention of Sauer.

Sauer as modified by Kuhr et al. does not mention scanning the voltage as clamed. Although Sauer discloses making measurements with the electrodes, he does not appear to indicate a specific measuring technique (col. 9, ll. 45-54).

Kuhr et al. teach sinusoidal voltammetry (the abstract). It would have been obvious to one with ordinary skill in the art at the time the invention was made to use sinusoidal voltammetry as taught by Kuhr et al. in the invention of Sauer as modified by Thormann et al. because as taught by Kuhr et al. sinusoidal voltammetry can be more sensitive for nucleotide or nucleic acid analysis than tradition electrochemical techniques (col. 2, ln. 55 – col. 3, ln. 25).

31. Claims 38 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sauer (US 5,407,554) in view of Thormann et al. ("Voltammetry at Linear Gold and Platinum Microelectrode Arrays Produced by Lithographic Techniques," Anal. Chem. 1985, 57, 2764-2770).

Addressing Claim 38, Sauer teaches a method of detecting the presence and measuring the concentration of analytes in a sample, the method comprising the steps of

(a) contacting a band electrode array sensor of the kind comprising

a substrate having a first edge (element 1 in Figures 12 and 14);

a layer of insulating material, on top of the substrate, the layer of insulating, material having a first edge (element 29 in Figures 12 and 14);

the first edge of the substrate and the first edge of the insulating material aligned to form a single edge (Figures 12 and 14);

a plurality of band electrodes between the substrate and the layer of insulating material, a surface of each of the band electrodes exposed at the single edge (Figures 12 and 14); and

a plurality of gaps, one gap between each of two adjacent band electrodes, the method comprising the step of

contacting the sensor with a sample suspected of containing an analyte (implied by col. 8, ll. 34-62, which teaches moistening the edge of the disc with analytical sample).

Sauer does not mention that the band electrodes are microband electrodes; however, this is implied by Claim 19 and Figures 12 and 14, which discloses that up to 24 narrow electrodes may be on a substrate disc having a diameter of 5 cm.

Sauer also does not mention that that the gaps between the electrodes are sufficient to prevent substantial overlap of diffusion layers; however, as shown by Thormann et al. it was known at the time of the invention that if electrodes are too closely spaced together inaccuracies in the measurement will result (last paragraph in the second column of page 2766 bridging to page 2767). Thus, it would have been obvious to one with ordinary skill in the art at the time the invention was made to have gaps between the electrodes large enough to avoid inaccuracies such as non-steady-state currents due to diffusion effects as taught by Thormann et al. in the invention of Sauer.

Addressing Claim 41, Sauer discloses amperometry in col. 1, ll. 19-29.

32. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sauer (US 5,407,554) in view of Kuhr et al. (US 5,958,215) and Thormann et al. ("Voltammetry at Linear Gold and Platinum Microelectrode Arrays Produced by Lithographic Techniques," Anal. Chem. 1985, 57, 2764-2770) as applied to claim 34 above, and further in view of Mochizuki et al. (US 3,530,046). Sauer as modified by Kuhr et al. do not mention that each microband electrode ash a width less than 25 micrometers and a thickness less than about 25 micrometers. Mochizuki et al. show that it was known at he time of the invention how make electrodes within applicant's claimed dimension ranges (col. 3, ll. 63-66 and Claims 2 and 3). It would have been obvious to one with ordinary skill in the art at the time the invention was made to have each microband electrode have a width less than 25 micrometers and a thickness less than about 25 micrometers as taught by Mochizuki et al. in the invention of Sauer of Kuhr et al. because this allow the sensor small and compact and useful if only small amounts of sample are available.

33. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Williams et al. (US 5,460,710) in view of Thormann et al. ("Voltammetry at Linear Gold and Platinum Microelectrode Arrays Produced by Lithographic Techniques," Anal. Chem. 1985, 57, 2764-2770) and Kuhr et al. (US 5,958,215).

Addressing Claim 34, Williams et al. teach a method of utilizing a band electrode array sensor of the kind comprising

a substrate having a first edge (element 10 in Figures 4 and 5);

a layer of insulating material, on top of the substrate, the layer of insulating, material having a first edge (element 20 in Figure 4 and element 60 in Figure 6);

the first edge of the substrate and the first edge of the insulating material aligned to form a single edge (Figures 4 and 5);

a plurality of band electrodes between the substrate and the layer of insulating material, a surface of each of the band electrodes exposed at the single edge (elements 30 and 32 in Figure 4 and elements 50, 54, and 56 in Figure 6); and

a plurality of gaps, one gab between each of two adjacent band electrodes, the method comprising the step of

contacting the sensor with a sample suspected of containing an analyte (implied by col. 11, ll. 19-20, which teaches measuring chlorine concentration).

Williams et al. do not mention that the band electrodes are microband electrodes; however, this is implied by col. 3, ll. 43-47, which discloses electrode widths less than 100 micrometers.

Williams et al. do not mention that that the gaps between the electrodes are sufficient to prevent substantial overlap of diffusion layers; however, as shown by Thormann et al. it was known at the time of the invention that if electrodes are too closely spaced together inaccuracies in the measurement will result (last paragraph in the second column of page 2766 bridging to page 2767). Thus it would have been obvious to one with ordinary skill in the art at the time the invention was made to have gaps between the electrodes large enough to avoid inaccuracies such as non-steady-state currents due to diffusion effects as taught by Thormann et al. in the invention of Williams et al.

Williams also do not mention scanning the voltage as clamed.

Kuhr et al. teach sinusoidal voltammetry (the abstract). It would have been obvious to one with ordinary skill in the art at the time the invention was made to use sinusoidal voltammetry as taught by Kuhr et al. in the invention of Williams et al. as modified by Thormann et al. because as taught by Kuhr et al. sinusoidal voltammetry can be more sensitive for nucleotide or nucleic acid analysis than traditional electrochemical techniques (col. 2, ln. 55 – col. 3, ln. 25).

34. Claims 38 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williams et al. (US 5,460,710) in view of Thormann et al. ("Voltammetry at Linear Gold and Platinum Microelectrode Arrays Produced by Lithographic Techniques," Anal. Chem. 1985, 57, 2764-2770).

Addressing Claim 38, Williams et al. teach a method of detecting the presence and measuring the concentration of analytes in a sample, the method comprising the steps of

a substrate having a first edge (element 10 in Figures 4 and 5);

a layer of insulating material, on top of the substrate, the layer of insulating, material having a first edge (element 20 in Figure 4 and element 60 in Figure 6);

the first edge of the substrate and the first edge of the insulating material aligned to form a single edge (Figures 4 and 5);

a plurality of band electrodes between the substrate and the layer of insulating material, a surface of each of the band electrodes exposed at the single edge (elements 30 and 32 in Figure 4 and elements 50, 54, and 56 in Figure 6); and

a plurality of gaps, one gab between each of two adjacent band electrodes, the method comprising the step of

contacting the sensor with a sample suspected of containing an analyte (implied by col. 11, ll. 19-20, which teaches measuring chlorine concentration).

Williams et al. do not mention that the band electrodes are microband electrodes; however, this is implied by col. 3, ll. 43-47, which discloses electrode widths less than 100 micrometers.

Williams et al. do not mention that that the gaps between the electrodes are sufficient to prevent substantial overlap of diffusion layers; however, as shown by Thormann et al. it was known at the time of the invention that if electrodes are too closely spaced together inaccuracies in the measurement will result (last paragraph in the second column of page 2766 bridging to page 2767). Thus it would have been obvious to one with ordinary skill in the art at the time the invention was made to have gaps between the electrodes large enough to avoid inaccuracies such as non-steady-state currents due to diffusion effects as taught by Thormann et al. in the invention of Williams et al.

Addressing Claim 41, measuring current is disclosed in Williams in Figure 10.

35. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Williams et al. (US 5,460,710) in view of Kuhr et al. (US 5,958,215) and Thormann et al. ("Voltammetry at Linear Gold and Platinum Microelectrode Arrays Produced by Lithographic Techniques," Anal.

Chem. 1985, 57, 2764-2770) as applied to claims 34, 38 above, and further in view of Mochizuki et al. (US 3,530,046). Williams et al. as modified by Kuhr et al. do not mention that each microband electrode ash a width less than 25 micrometers and a thickness less than about 25 micrometers. Mochizuki et al. show that it was known at he time of the invention how make electrodes within applicant's claimed dimension ranges (col. 3, ll. 63-66 and Claims 2 and 3). It would have been obvious to one with ordinary skill in the art at the time the invention was made to have each microband electrode have a width less than 25 micrometers and a thickness less than about 25 micrometers as taught by Mochizuki et al. in the invention of Williams et al. as modified by Kuhr et al. because then the sensor will be small and compact and useful even if only small amounts of sample are available.

36. Claims 36, 37, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over and Thormann et al. ("Voltammetry at Linear Gold and Platinum Microelectrode Arrays Produced by Lithographic Techniques," Anal. Chem. 1985, 57, 2764-2770) in view of Wojciechowski et al. (US 5,873,990).

Addressing Claims 36 and 40, Thormann et al. teach a method of utilizing a microband electrode array sensor comprising a substrate having a first edge (the abstract and element "S" in Figure 2);

a layer of insulating material on top of the substrate, the layer of insulating material having a first edge (element "D" in Figure 2);

the first edge of the substrate and the first edge of the insulating material aligned to form a single edge (Figure 2);

a plurality of microband electrodes between the substrate and the layer of insulating material, surface of each microband electrodes exposed at eh single edge (elements "M" in Figure 2); and

a plurality of gaps, one gap between each of two adjacent microband electrodes and each of the gaps having a length great enough that no substantial overlap of diffusion layers occurs (implied by Figure 2 and last paragraph in the second column of page 2766 bridging to page 2767); the method comprising the step of

contacting the sensor with a sample suspected of containing an analyte (implied by Figure 3).

Thormann et al. do not disclose anodic stripping voltammetry, although they do disclose cyclic voltammetry (Figure 3). Wojciechowski et al. teach performing anodic stripping voltammetry (the abstract and col. 2, ll. 21-27; col. 8, ln. 64 – col. 9, ln. 3; and col. 26, ll. 61-67). It would have been obvious to one with ordinary skill in the art at the time the invention was made to use anodic stripping voltammetry as taught by Wojciechowski et al. in the invention of Thormann et al. because as taught by Wojciechowski et al. the sensor will then be capable of high sensitivity monitoring of metal ions.

Addressing Claim 37, for the width and thickness ranges of Claim 35 see the details of array I in Table II on page 2766.

37. Claims 36, 37, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williams et al. (US 5,460,710) in view of Thormann et al. ("Voltammetry at Linear Gold and Platinum Microelectrode Arrays Produced by Lithographic Techniques," Anal. Chem. 1985, 57, 2764-2770) and Wojciechowski et al. (US 5,873,990).

Addressing Claim 36, Williams et al. teach a method of utilizing a band electrode array sensor comprising a substrate having a first edge (element 10 in Figures 4 and 5);

a layer of insulating material on top of the substrate, the layer of insulating material having a first edge (element 20 in Figure 4 and element 60 in Figure 6);

the first edge of the substrate and the first edge of the insulating material aligned to form a single edge (Figures 4 and 5);

a plurality of microband electrodes between the substrate and the layer of insulating material, a surface of each microband electrodes exposed at the single edge (elements 30 and 32 in Figure 4 and elements 50, 54, and 56 in Figure 6); and

a plurality of gaps, one gap between each of two adjacent microband electrodes (Figures 4 and 5); the method comprising the step of

contacting the sensor with a sample suspected of containing an analyte (implied by col. 11, ll. 19-20, which teaches measuring chlorine concentration).

Williams et al. do not mention that that the gaps between the electrodes are sufficient to prevent substantial overlap of diffusion layers; however, as shown by Thormann et al. it was known at the time of the invention that if electrodes are too closely spaced together inaccuracies in the measurement will result (last paragraph in the second column of page 2766 bridging to page 2767). Thus it would have been obvious to one with ordinary skill in the art at the time the

invention was made to have gaps between the electrodes large enough to avoid inaccuracies such as non-steady-state currents due to diffusion effects as taught by Thormann et al. in the invention of Williams et al.

Williams et al. as modified by Thormann et al. do not disclose anodic stripping voltammetry, although they do disclose cyclic voltammetry (Figure 3). Wojciechowski et al. teach performing anodic stripping voltammetry (the abstract and col. 2, ll. 21-27; col. 8, ln. 64 – col. 9, ln. 3; and col. 26, ll. 61-67). It would have been obvious to one with ordinary skill in the art at the time the invention was made to use anodic stripping voltammetry as taught by Wojciechowski et al. in the invention of Williams et al. as modified by Thormann et al. because as taught by Wojciechowski et al. the sensor will then be capable of high sensitivity monitoring of metal ions.

Addressing Claim 37, Williams et al. as modified by Wojciechowski et al. do not mention that each microband electrode has a width less than 25 micrometers and a thickness less than about 25 micrometers. Thormann et al. show that it was known at he time of the invention how make electrodes within applicant's claimed dimension ranges (details of array I in Table II on page 2766). It would have been obvious to one with ordinary skill in the art at the time the invention was made to have each microband electrode have a width less than 25 micrometers and a thickness less than about 25 micrometers as taught by Thormann et al. in the invention of Williams et al. as modified by Wojciechowski et al. because then the sensor will be small and compact and useful even if only small amounts of sample are available.

38. Claims 36, 37, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sauer (US 5,407,554) in view of Thormann et al. ("Voltammetry at Linear Gold and Platinum Microelectrode Arrays Produced by Lithographic Techniques," Anal. Chem. 1985, 57, 2764-2770) and Wojciechowski et al. (US 5,873,990).

Addressing Claims 36 and 40, Sauer teaches a method of utilizing a band electrode array sensor comprising a substrate having a first edge (element 1 in Figures 12 and 14);

a layer of insulating material on top of the substrate, the layer of insulating material having a first edge (element 29 in Figures 12 and 14);

the first edge of the substrate and the first edge of the insulating material aligned to form a single edge (Figures 12 and 14);

a plurality of microband electrodes between the substrate and the layer of insulating material, a surface of each microband electrodes exposed at the single edge (Figures 12 and 14); and

a plurality of gaps, one gap between each of two adjacent microband electrodes (Figures 12 and 14); the method comprising the step of

contacting the sensor with a sample suspected of containing an analyte (implied by col. 8, ll. 34-62, which teaches moistening the edge of the disc with analytical sample).

Sauer does not mention that that the gaps between the electrodes are sufficient to prevent substantial overlap of diffusion layers; however, as shown by Thormann et al. it was known at the time of the invention that if electrodes are too closely spaced together inaccuracies in the measurement will result (last paragraph in the second column of page 2766 bridging to page 2767). Thus it would have been obvious to one with ordinary skill in the art at the time the

invention was made to have gaps between the electrodes large enough to avoid inaccuracies such as non-steady-state currents due to diffusion effects as taught by Thormann et al. in the invention of Sauer.

Sauer as modified by Thormann et al. do not disclose anodic stripping voltammetry, although they do disclose cyclic voltammetry (Figure 3). Wojciechowski et al. teach performing anodic stripping voltammetry (the abstract and col. 2, ll. 21-27; col. 8, ln. 64 – col. 9, ln. 3; and col. 26, ll. 61-67). It would have been obvious to one with ordinary skill in the art at the time the invention was made to use anodic stripping voltammetry as taught by Wojciechowski et al. in the invention of Sauer as modified by Thormann et al. because as taught by Wojciechowski et al. the sensor will then be capable of high sensitivity monitoring of metal ions.

Addressing Claim 37, Sauer as modified by Wojciechowski et al. et al. do not mention that each microband electrode ash a width less than 25 micrometers and a thickness less than about 25 micrometers. Thormann et al. show that it was known at he time of the invention how make electrodes within applicant's claimed dimension ranges (details of array I in Table II on page 2766). It would have been obvious to one with ordinary skill in the art at the time the invention was made to have each microband electrode have a width less than 25 micrometers and a thickness less than about 25 micrometers as taught by Thormann et al. in the invention of Sauer as modified by Wojciechowski et al. because then the sensor will be small and compact and useful even if only small amounts of sample are available.

39. Claims 39, 42, and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sauer (US 5,407,554) in view of Thormann et al. ("Voltammetry at Linear Gold and Platinum Microelectrode Arrays Produced by Lithographic Techniques," Anal. Chem. 1985, 57, 2764-2770) as applied to claim 38 above, and further in view of Kuhr et al. (US 5,958,215). Sauer as modified by Kuhr et al. does not mention scanning the voltage as clamed. Although Sauer discloses making measurements with the electrodes, he does not appear to indicate a specific measuring technique (col. 9, ll. 45-54).

Kuhr et al. teach sinusoidal voltammetry (the abstract). It would have been obvious to one with ordinary skill in the art at the time the invention was made to use sinusoidal voltammetry as taught by Kuhr et al. in the invention of Sauer as modified by Thormann et al. because as taught by Kuhr et al. sinusoidal voltammetry can be more sensitive for nucleotide or nucleic acid analysis than tradition electrochemical techniques (col. 2, ln. 55 – col. 3, ln. 25).

40. Claims 39, 42, and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williams et al. (US 5,460,710) in view of Thormann et al. ("Voltammetry at Linear Gold and Platinum Microelectrode Arrays Produced by Lithographic Techniques," Anal. Chem. 1985, 57, 2764-2770) as applied to claim 38 above, and further in view of Williams also do not mention scanning the voltage as clamed.

Kuhr et al. teach sinusoidal voltammetry (the abstract). It would have been obvious to one with ordinary skill in the art at the time the invention was made to use sinusoidal voltammetry as taught by Kuhr et al. in the invention of Williams et al. as modified by Thormann et al. because as taught by Kuhr et al. sinusoidal voltammetry can be more sensitive

for nucleotide or nucleic acid analysis than tradition electrochemical techniques (col. 2, ln. 55 – col. 3, ln. 25).

Allowable Subject Matter

41. Claim 46 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action.

42. Claims 44, 45, 47, and 48 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

43. The following is a statement of reasons for the indication of allowable subject matter:

a) Claim 44: Sauer, Williams et al., and Thormann et al. only disclose a single layer of microband electrode array sensors. It would not have been obvious to modify their sensors so as to have a plurality of microband electrode array sensors separated from each other by insulating material because this would require substantial structural change to their inventions;

b) Claim 45 depends from Claim 44;

c) Claim 46: in the prior art reviewed by the examiner the electrodes are not aligned with the substrate and insulating layer as claimed. For example, in Mathies et al. (US 6,045,676) the

electrodes significantly project in the channel (Figures 4, 5, 7, 10, 18); that is, the first edges of the electrodes are significantly offset from the first edges of the substrate and insulating layer. Similarly for Kovacs (US 5,580,435) (Figures 1A, 1B, and 1C) and Clark et al. (US 5,194,133) (Figure 2 and col. 2, ll. 36-39); and

d) Claims 47 and 48 depend from Claim 46.

Information Disclosure Statement

44. Applicant is requested to provide a copy of the article by Guerin et al. cited on the IDS of November 24, 2000, but not found in the parent applicioant.

45. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEX NOGUEROLA whose telephone number is (703) 305-5686. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, JILL WARDEN can be reached on (703) 308-4037. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7719 for regular communications and (703) 305-5433 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Alex Noguerola
July 1, 2002

Jill Warden
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